(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date 10 July 2003 (10.07.2003)

PCT

(10) International Publication Number WO 03/056885 A1

(51) International Patent Classification7: H05B 41/282

PCT/IB02/05467 (21) International Application Number:

(22) International Filing Date:

18 December 2002 (18.12.2002)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data: 102 00 022.0

2 January 2002 (02.01.2002)

(71) Applicant (for DE only): PHILIPS INTELLECTUAL PROPERTY & STANDARDS GMBH [DE/DE]; Steindamm 94, 20099 Hamburg (DE).

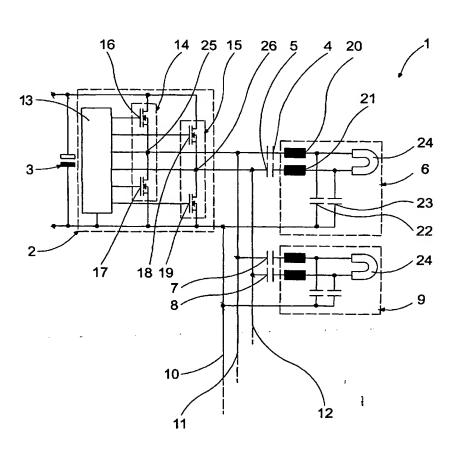
(71) Applicant (for all designated States except DE, SI, US): KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

- (75) Inventors/Applicants (for US only): BÖKE, Ulrich [DE/DE]; c/o Philips Intellectual Property & Standards GmbH, Weisshausstr. 2, 52066 Aachen (DE). BOCK, Antoon [DE/DE]; c/o Philips Intellectual Property & Standards GmbH, Weisshausstr. 2, 52066 Aachen (DE).
- (74) Agent: VOLMER, Georg; Philips Intellectual Property & Standards GmbH, Weisshausstr. 2, 52066 Aachen (DE).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,

[Continued on next page]

(54) Title: CIRCUIT ARRANGEMENT FOR OPERATION OF ONE OR MORE LAMPS



(57) Abstract: The invention relates to a background lighting system for a liquid crystal display, more particularly to an electronic circuit for operation of one or more discharge lamps. A DC/AC full-bridge inverter circuit generates two voltages whose AC components are phase-shifted by 180°. discharge lamps are supplied with the sum of these two AC voltages.

WO 03/056885 A1



LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK,

TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

ln _	nal Application No
Fu i	02/05467

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H05B41/282

According to International Patent	Classification	(IPC) or to both	national of	classification	and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols) $IPC\ 7\ H05B$

Documentation searched other than minimum documentation to the extent that such documents are included. In the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

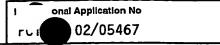
EPO-Internal, WPI Data, PAJ, COMPENDEX, INSPEC

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 615 093 A (NALBANT MEHMET K) 25 March 1997 (1997-03-25) column 1, line 12 -column 11, line 24; figures 1-9	1-5
X	GULES R ET AL: "A 1.2 kW electronic ballast for multiple lamps, with dimming capability and high-power-factor" APPLIED POWER ELECTRONICS CONFERENCE AND EXPOSITION, 1999. APEC '99. FOURTEENTH ANNUAL DALLAS, TX, USA 14-18 MARCH 1999, PISCATAWAY, NJ, USA, IEEE, US, 14 March 1999 (1999-03-14), pages 720-726, XP010323608 ISBN: 0-7803-5160-6 page 720 -page 723; figures 1-10	1-5

χ Further documents are listed in the continuation of box C.	Patent family members are listed in annex.
P Special categories of cited documents: A' document defining the general state of the art which is not considered to be of particular relevance E' earlier document but published on or after the international filing date 'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) 'O' document referring to an oral disclosure, use, exhibition or other means 'P' document published prior to the international filing date but later than the priority date claimed	 "T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "8" document member of the same patent family
Date of the actual completion of the International search 20 March 2003	Date of mailing of the International search report 27/03/2003
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Authorized officer Albertsson, E

T	•	nal Application No	
	ru i	02/05467	
_			

0 (0 1)	THE PROPERTY CONSIDERED TO BE DELEVANT	FC1 02/05407
C.(Continu	ation) DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages	Retevant to claim No.
X	TADESSE D ET AL: "A comparison of power circuit topologies and control techniques for a high frequency ballast" INDUSTRY APPLICATIONS SOCIETY ANNUAL MEETING, 1993., CONFERENCE RECORD OF THE 1993 IEEE TORONTO, ONT., CANADA 2-8 OCT. 1993, NEW YORK, NY, USA, IEEE, US, 2 October 1993 (1993-10-02), pages 2341-2347, XP010118644 ISBN: 0-7803-1462-X page 2341 -page 2345; figures 1-6	1-5
X	SPIAZZI G ET AL: "High-quality rectifiers with high-frequency insulation-an overview" INDUSTRIAL ELECTRONICS, 1995. ISIE '95., PROCEEDINGS OF THE IEEE INTERNATIONAL SYMPOSIUM ON ATHENS, GREECE 10-14 JULY 1995, NEW YORK, NY, USA, IEEE, US, 10 July 1995 (1995-07-10), pages 64-71, XP010161393 ISBN: 0-7803-2683-0 page 64 -page 69; figures 1-14	1-5
X	US 5 744 915 A (NILSSEN OLE K) 28 April 1998 (1998-04-28) column 2 -column 23; figures 1-14	1
A	DONAHUE J A ET AL: "The LCC inverter as a cold cathode fluorescent lamp driver" APPLIED POWER ELECTRONICS CONFERENCE AND EXPOSITION, 1994. APEC '94. CONFERENCE PROCEEDINGS 1994., NINTH ANNUAL ORLANDO, FL, USA 13=17 FEB. 1994, NEW YORK, NY, USA, IEEE, 13 February 1994 (1994-02-13), pages 427-433, XP010118539 ISBN: 0-7803-1456-5 abstract; figures 1-7	1,7
A .	LEE S W ET AL: "Simplified control technique for LCD backlight inverter system using the mixed dimming method" APEC 2001. 16TH. ANNUAL IEEE APPLIED POWER ELECTRONICS CONFERENCE AND EXPOSITION. ANAHEIM, CA, MARCH 4 - 8, 2001, ANNUAL APPLIED POWER ELECTRONICS CONFERENCE, NEW YORK, NY: IEEE, US, vol. 1 OF 2. CONF.16, 4 March 2001 (2001-03-04), pages 447-453, XP010536032 ISBN: 0-7803-6618-2 abstract; figures 1-8	1,7
	-/	



C (Continue	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	
Category °		Relevant to claim No.
A	MADER U: "Steady-state analysis of a voltage-fed inverter with second-order network and fluorescent lamp load" APPLIED POWER ELECTRONICS CONFERENCE AND EXPOSITION, 1996. APEC '96. CONFERENCE PROCEEDINGS 1996., ELEVENTH ANNUAL SAN JOSE, CA, USA 3-7 MARCH 1996, NEW YORK, NY, USA, IEEE, US, 3 March 1996 (1996-03-03), pages 609-615, XP010159847 ISBN: 0-7803-3044-7	
Α	CORREA J ET AL: "A COMPARISON OF LCC AND LC FILTERS FOR ITS APPLICATION IN ELECTRONIC BALLAST FOR METAL-HALIDE LAMPS" 32ND.ANNUAL IEEE POWER ELECTRONICS SPECIALISTS CONFERENCE. PESC 2001. CONFERENCE PROCEEDINGS. VANCOUVER, CANADA, JUNE 17 - 21, 2001, ANNUAL POWER ELECTRONICS SPECIALISTS CONFERENCE, NEW YORK, NY: IEEE, US, vol. 1 OF 4. CONF. 32, 17 June 2001 (2001-06-17), pages 114-119, XP001049520 ISBN: 0-7803-7067-8	
A	RIBAS J ET AL: "A NEW DISCHARGE LAMP BALLAST BASED ON A SELF-OSCILLATING FULL-BRIDGE INVERTER INTEGRATED WITH A BUCK-TYPE PFC CIRCUIT" APEC 2001. 16TH. ANNUAL IEEE APPLIED POWER ELECTRONICS CONFERENCE AND EXPOSITION. ANAHEIM, CA, MARCH 4 - 8, 2001, ANNUAL APPLIED POWER ELECTRONICS CONFERENCE, NEW YORK, NY: IEEE, US, vol. 2 OF 2. CONF. 16, 4 March 2001 (2001-03-04), pages 688-694, XP001049793 ISBN: 0-7803-6618-2	
A .	BRANAS C ET AL: "Electronic ballast for 250 W HPS lamps based on the LCC resonant inverter with soft start-up and quasi-optimum control" INDUSTRIAL ELECTRONICS, 1999. ISIE '99. PROCEEDINGS OF THE IEEE INTERNATIONAL SYMPOSIUM ON BLED, SLOVENIA 12-16 JULY 1999, PISCATAWAY, NJ, USA, IEEE, US, 12 July 1999 (1999-07-12), pages 768-773, XP010354016 ISBN: 0-7803-5662-4	

ional Application No

	N Company of the Comp				
Patent document cited in search report	Publication date		Patent family member(s)		Publication date
US 5615093	A 25-03-1997	TW	400685	В	01-08-2000
UC 5744015	A 28-04-1998	US	E420266		27-06-1995
US 5744915	A 20-04-1996		5428266		
		US	4184128		15-01-1980
		US	5512801		30-04-1996
		US	5471118		28-11-1995
		US	5459375	Α	17-10-1995
		US	5757144	Α	26-05-1998
		US	5469028	Α	21-11-1995
		US	5479074	Α	26-12-1995
		US	6002210	Α	14-12-1999
		US	5446346		29-08-1995
		ÜS	6459213		01-10-2002
		US	5191262		02-03-1993
		US	5446347		29-08-1995
		US			26-05-1998
		US	5757140		23-08-1994
					13-02-1994
		US		A	
		US	5343124		30-08-1994
		US	5426347		20-06-1995
		US	5510681		23-04-1996
		US	5371441		06-12-1994
		US	6172464		09-01-2001
		US	5559393		24-09-1996
		US	6211619		03-04-2001
		US	5691603		25-11-1997
		US	6198228	B1	06-03-2001
		บร	6211625	B1	03-04-2001
		US	5640069	Α	17-06-1997
		บร	5047690	Α	10-09-1991
		US	5185560	Α	09-02-1993
		US	5166578	Α	24-11-1992
		US	5164637		17-11-1992
		US	6100643		08-08-2000
		US	5214355		25-05-1993
		US	5214356		25-05-1993
		US	5233270		03-08-1993
		US	6144445		07-11-2000
		ÜS	5510680		23-04-1996
		ÜS	5489823		06-02-1996
		ÜŠ	5416386		16-05-1995
		US	5422546		06-06-1995
		US	5426349		20-06-1995
		US	5440209		08-08-1995
		US	5402043		28-03-1995
		US	5432409		11-07-1995
		US	5481160		02-01-1996
		US	5736819		07-04-1998
		US	4857806		15-08-1989
		US	5438239		01-08-1995
	v .				30-06-1987
1		US US	4677345 4513364		23-04-1985